

SUPPORTABILITY, A SYSTEMS ENGINEERING PERSPECTIVE

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SYSTEMS ENGINEERING:

**“AN INTERDISCIPLINARY, COLLABORATIVE
APPROACH TO DERIVE, EVOLVE, AND
VERIFY A LIFE CYCLE BALANCED SYSTEMS
SOLUTION WHICH SATISFIES CUSTOMER
EXPECTATIONS.....”**

**IEEE P1220, STANDARD FOR APPLICATION AND MANAGEMENT OF
THE SYSTEMS ENGINEERING PROCESS**

SUCCESSFUL EXECUTION IS A FUNCTION OF

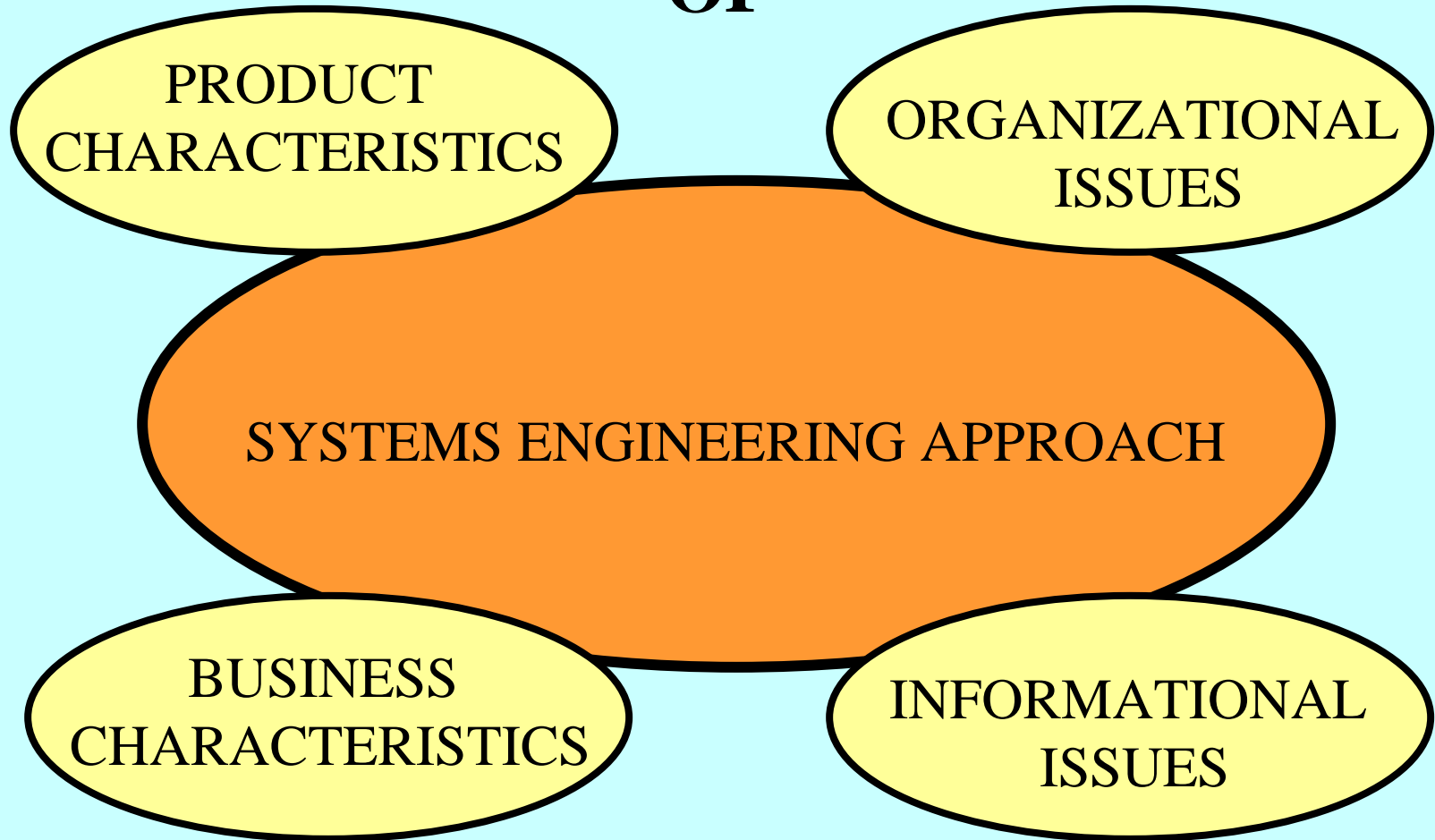
PRODUCT
CHARACTERISTICS

ORGANIZATIONAL
ISSUES

SYSTEMS ENGINEERING APPROACH

BUSINESS
CHARACTERISTICS

INFORMATIONAL
ISSUES



PRODUCT CHARACTERISTICS:

- INCREASED COMPLEXITY
- MULTI-USE PRODUCTS
- LONGER LIFE CYCLES
- PUSHING TECHNOLOGY
- INCREASED INTERDEPENDENCY
BETWEEN SYSTEMS WITHIN A SINGLE
PRODUCT

MISSION RELIABILITY:

WAS –

**MISSION ESSENTIAL EQUIPMENT LIST,
FAILURE RATE, AND
PROBABILITY OF OCCURANCE OF AN EVENT.**

**COMPLEXITY DETERMINED BY THE
EXISTANCE OF ACTIVE OR PASSIVE
REDUNDANCY**

SINGULAR OR DUAL MISSION ENVIRONMENT

MISSION RELIABILITY:

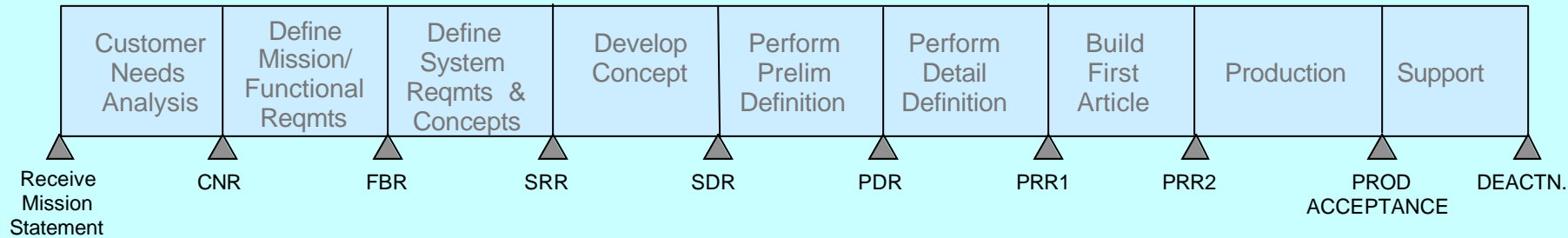
NOW –

MISSION ESSENTIAL FUNCTION LIST,
FAILURE RATE, AND
PROBABILITY OF OCCURANCE OF AN EVENT.

COMPLEXITY DETERMINED BY MIGRATING
FUNCTIONS, GRACEFUL DEGRADATION, AND
REDUNDANCY MANAGEMENT

RE-DEFINING MISSIONS

Managing Life Cycle Phases



SUPPORT POSTURE FOR POST PRODUCTION
SUPPORT PHASES NEEDS TO BE DESIGNED
INTO THE PRODUCT UP FRONT.

FUTURE REQUIREMENTS NEED TO BE
UNDERSTOOD - NOW

MANAGE THE PRODUCT LIFECYCLE

- BUILD FUTURE EXPANSION INTO THE SYSTEM
- INTEGRATE THE CONCEPT OF SUPPORT INTO THE CONCEPTUAL DESIGN
- UNDERSTAND CUSTOMER NEEDS AND USES FOR THE FUTURE
- UNDERSTAND AND IDENTIFY PRODUCT ATTRIBUTES

BUSINESS CHARACTERISTICS:

- MULTIPLE USING ORGANIZATIONS
- EMPHASIS ON TOTAL COST OF OWNERSHIP
- COST CONTAINMENT IS AN IMPERATIVE

EMPHASIS ON TOTAL COST OF OWNERSHIP

- SIMULATION BASES ACQUISITION TO DETERMINE ANTICIPATED COST OF OWNERSHIP FOR A VARIETY OF USERS
- GREATER FIDELITY OF INFORMATION REQUIRED EARLIER IN THE PROGRAM
- DEPENDENT UPON MANAGED SOURCE OF DATA TO GENERATE INFORMATION

COST CONTAINMENT IS AN IMPERATIVE

- TRADE STUDIES TO COST VS CAPABILITY
- RISK MANAGEMENT IS IMPERATIVE
- PROGRAM TPM'S STRICTLY ENFORCED

ORGANIZATIONAL ISSUES:

- IPT OWNERSHIP THROUGHOUT THE LIFE CYCLE.
- COORDINATION BETWEEN DESIGN TEAMS.
- “RIGHT SIZE THE ORGANIZATION”
- MATRIX ORGANIZATION TO ENHANCE SUCCESS

IPT OWNERSHIP THROUGHOUT THE LIFE CYCLE.

- SYSTEMS ARE DEFINED, DESIGNED AND MANAGED BY FOR THE LIFE CYCLE
- SYSTEM “FUNCTIONS” MAY NOT BE COMPATABLE WITH TEAM DEFINITION
- INTERFACES MAYBE OVERLOOKED
- BUDGETS ARE ALLOCATED BY TEAM STRUCTURE
- WORKFLOW NEEDS TO BE DEFINED AND IMPLEMENTED

“RIGHT SIZE THE ORGANIZATION”

- MANAGE BY FUNCTIONAL DISCIPLINES TO “SUPPORT” TEAM STRUCTURE
- NEED TO UNDERSTAND THE RELATIONSHIP BETWEEN FUNCTIONS TO DETERMINE OPTIMAL STAFFING LEVELS
- IDENTIFY AND IMPLEMENT FUNCTIONAL PROCESSES

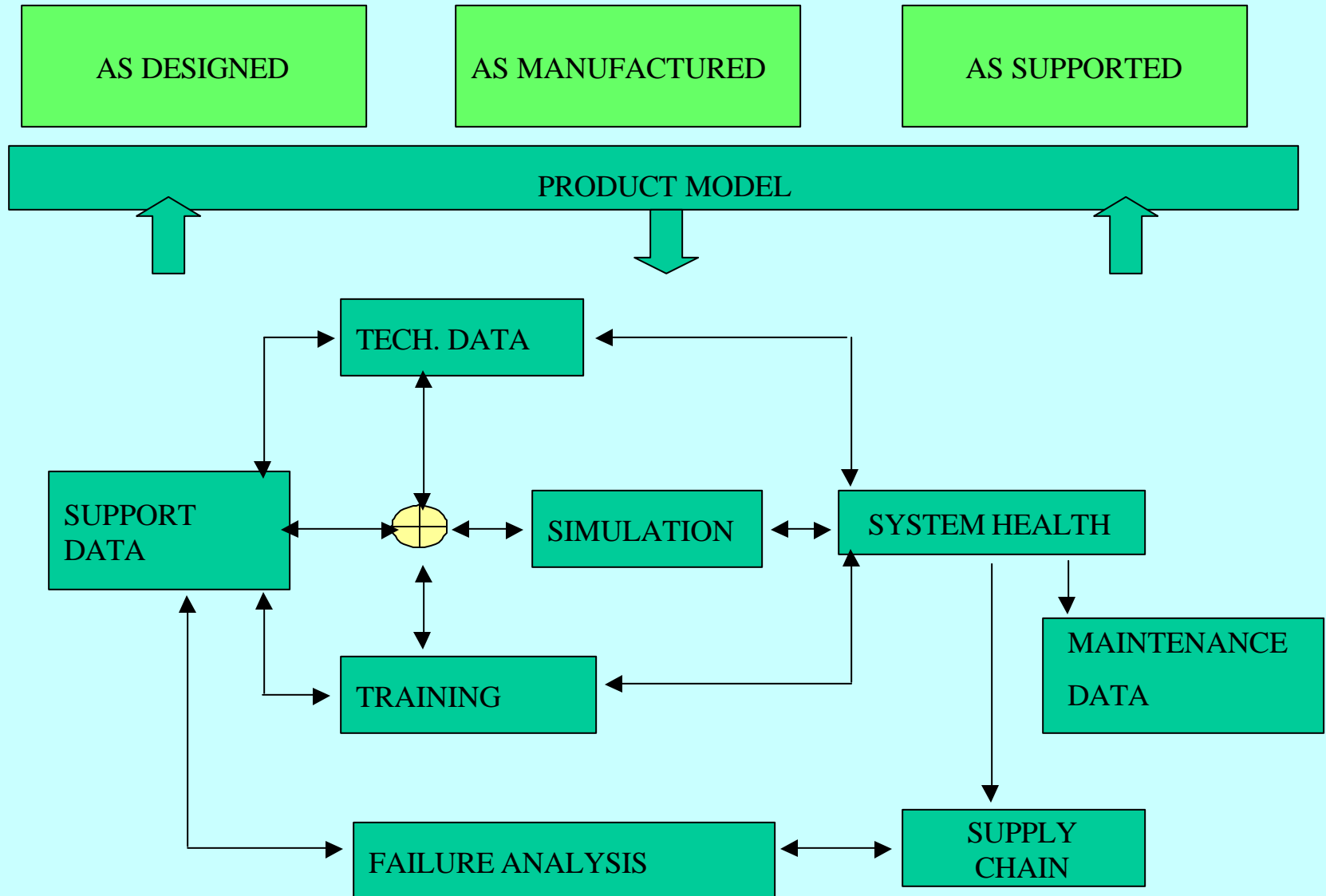
“RIGHT SIZE THE ORGANIZATION”

- “CORE UP” BUDGETS TO MANAGE WORK, PEOPLE DO NOT COME IN “FRACTIONAL PARTS” PERFORMANCE NEEDS TO BE RECOGNIZED

INFORMATIONAL ISSUES:

- DATA DRIVEN ENVIRONMENT VS INFORMATION DRIVEN ENVIRONMENT.
- DATA IS AN “ASSET”
- “COMPLETE” CONFIGURATION MANAGEMENT

PRODUCT DATA AND TYPICAL ATTRIBUTES



DATA DRIVEN ENVIRONMENT

- DATA HAS MORE “UTILITY” THAN INFORMATION
- DATA IS APPLICATION INDEPENDENT,
- DATA IS THE PREFERRED EXCHANGE FORM,
- WORKFLOW DEFINES THE INTERFACES AND NEEDS OF “USERS” OF DATA

CONCLUSION:

- COMPLEXITY OF DESIGN AND EMPLOYMENT SCENARIOS REQUIRE EARLIER AND MORE DETAILED REQUIREMENTS DEFINITION
- PROCESS BY WHICH WORK IS ACCOMPLISHED NEED TO BE DEFINED AND IMPLEMENTED TO ENSURE I.M.P. CAN BE DEFINED AND SCHEDULED

CONCLUSION (cont.):

- STAFFING MANAGED WITH A STRONG MATRIX APPROACH
- PRODUCT MODEL MUST ENCOMPASS ALL OF THE “ATTRIBUTES” OF A PRODUCT
- MANAGEMENT OF THE PHYSICAL CONFIGURATION OF THE PRODUCT, AS WELL AS THE DATA THAT DESCRIBES IT, IS ESSENTIAL

CONCLUSION (cont.):

- NEAR TERM AND LONG TERM NEEDS OF THE USING COMMUNITIES NEED TO BE UNDERSTOOD AND DOCUMENTED.
- MANAGEMENT OF DATA IN THE “VIRTUAL ENTERPRISE” NEEDS TO BE ACCOMPLISHED. ALL INVOLVED ENTITIES NEED TO BE INCLUDED, CUSTOMER, SUPPLIERS, PARTNERS, DESIGN AND MANUFACTURING SITES.

FINAL THOUGHT:

COMPREHENSIVE SYSTEMS ENGINEERING
APPROACH IS THE ONLY WAY TO
MANAGE THESE COMPLEX TASKS AND
ENSURE THEIR SUCCESSFUL
INTEGRATION AND COMPLETION.